

CLAIMS

1. A method of copying a copy protected optical disc, the method comprising the steps of reading data from an optical disc at a selected level
5 which differs from the user data level, and writing the data read from said selected level to an optical disc to create a usable copy of a copy protected optical disc.
2. A method of copying a copy protected optical disc as claimed in Claim 1,
10 wherein the data levels at least comprise, from highest to lowest, the user data level, a data frame level, an error corrected level, and an encoded data level, and wherein the data is read from the optical disc at the error corrected level.
3. A method of copying a copy protected optical disc as claimed in Claim 2,
15 further comprising reading the data from the error corrected level without any error correction codes, and writing the read data to an optical disc, the writing step involving generating error correction codes for the read data.
4. A method of copying a copy protected optical disc as claimed in Claim 2,
20 further comprising reading the data from the error corrected level together with any error correction codes and writing the read data to an optical disc.
5. A method of copying a copy protected optical disc as claimed in Claim 3 or Claim 4, wherein writing the read data to an optical disc comprises
25 interleaving the read data together with the error correction codes, encoding the interleaved data in accordance with EFM Plus encoding and writing the resultant bit stream to the optical disc.
6. A method of copying a copy protected optical disc as claimed in Claim 1,
30 wherein the data levels at least comprise, from highest to lowest, the user data level, a data frame level, an error corrected level, and an encoded data level, and wherein the data is read from the optical disc at the data frame level.
7. A method of copying a copy protected optical disc as claimed in Claim 6,
35 further comprising reading the data from the data frame level without any additional codes, and writing the read data to an optical disc, the writing step

involving generating additional codes for the read data.

8. A method of copying a copy protected optical disc as claimed in Claim 7, wherein the additional codes generated include sector numbers.

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9. A method of copying a copy protected optical disc as claimed in Claim 6, further comprising reading the data from the data frame level together with any additional codes and writing the read data to an optical disc.

10 10. A method of copying a copy protected optical disc as claimed in any of Claims 7 to 9, wherein writing the read data to an optical disc comprises scrambling and subsequently error correcting the read data together with the additional codes, interleaving the error corrected data, encoding the interleaved data in accordance with EFM Plus encoding and writing the resultant bit stream
15 to the optical disc.

11. A method of copying a copy protected optical disc as claimed in Claim 1, wherein the data levels at least comprise, from highest to lowest, the user data level, a data frame level, an error corrected level, an interleaved level, and an
20 encoded data level, and wherein the data is read from the optical disc at the interleaved level, and further comprising writing the read data to an optical disc.

12. A method of copying a copy protected optical disc as claimed in Claim 1, wherein the data levels at least comprise, from highest to lowest, the user data
25 level, a data frame level, an error corrected level, and an encoded data level, and wherein the data is read from the disc at the encoded data level, and further comprising writing the read encoded data to an optical disc.

13. A method of copying a copy protected optical disc as claimed in Claim
30 12, wherein the read encoded data is a bit stream in accordance with EFM Plus encoding and the bit stream is written to the optical disc.

14. A method of copying a copy protected optical disc as claimed in any preceding claim, further comprising the step of creating the Lead-In for the
35 optical disc being written.

15. A method of copying a copy protected optical disc as claimed in Claim 14, wherein the created Lead-In specifies the physical characteristics and/or manufacturing information for the optical disc being written.
- 5 16. A method of copying a copy protected optical disc as claimed in any of Claims 1 to 13, further comprising the step of specifying physical characteristics for the optical disc being written and writing the specified physical characteristics to the Lead-In on the optical disc.
- 10 17. A method of copying a copy protected optical disc as claimed in any of Claims 1 to 13 and 16, further comprising the step of specifying manufacturing information for the optical disc being written and writing the specified manufacturing information to the Lead-In on the optical disc.
- 15 18. A method of copying a copy protected optical disc as claimed in any of Claims 1 to 13, further comprising the step of enabling reading and writing of discs using absolute sector addresses, and using the absolute sector addresses to read the entire data in the Lead-In of a copy protected optical disc, and writing the data read from the Lead-In to the Lead-In of the optical
20 disc being written.
19. A method of copying a copy protected optical disc as claimed in any of Claims 1 to 13, further comprising the step of enabling reading and writing of discs using negative relative sector addresses, and using the negative relative
25 sector addresses to read the entire data in the Lead-In of a copy protected optical disc, and writing the data read from the Lead-In to the Lead-In of the optical disc being written.
20. Apparatus for copying optical discs, the apparatus comprising means for
30 reading data from an optical disc at a selected level which differs from the user data level, and means for writing the data read from said selected level to an optical disc.
21. Apparatus for copying optical discs as claimed in Claim 20, wherein the
35 means for reading data from an optical disc at a selected level comprises pickup means to detect the data carried on an optical disc, and decoding

means for decoding the detected data, and wherein the means for writing the data to an optical disc comprises encoding means for encoding the decoded data, and mastering means for representing the encoded data on an optical disc.

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22. Apparatus for copying optical discs as claimed in Claim 20, wherein the means for reading data from an optical disc at a selected level comprises pickup means to detect the data carried on an optical disc, decoding means for decoding the detected data, and means for arranging the decoded data into a recording frame, and wherein the means for writing the data to an optical disc comprises encoding means for encoding the data in the recording frame, and mastering means for representing the encoded data on an optical disc.

23. Apparatus for copying optical discs as claimed in Claim 20, wherein the means for reading data from an optical disc at a selected level comprises pickup means to detect the data carried on an optical disc, decoding means for decoding the detected data, de-interleaving means for arranging the decoded data into an ECC block, and wherein the means for writing the data to an optical disc comprises interleaving means for interleaving the data in the ECC block, encoding means for encoding the interleaved data, and mastering means for representing the encoded data on an optical disc.

24. Apparatus for copying optical discs as claimed in Claim 20, wherein the means for reading data from an optical disc at a selected level comprises pickup means to detect the data carried on an optical disc, decoding means for decoding the detected data, de-interleaving means for arranging the decoded data into an ECC block, and error correction decoding means for determining error corrected data from said ECC block, and wherein the means for writing the data to an optical disc comprises error correction encoding means for encoding said error corrected data to form an ECC block, interleaving means for interleaving the data in the ECC block, encoding means for encoding the interleaved data, and mastering means for representing the encoded data on an optical disc.

25. Apparatus for copying optical discs as claimed in Claim 20, wherein the means for reading data from an optical disc at a selected level comprises

-21-

pickup means to detect the data carried on an optical disc, decoding means for decoding the detected data, de-interleaving means for arranging the decoded data into an ECC block, error correction decoding means for determining error corrected data from said ECC block, and unscrambling means for unscrambling
5 the determined error corrected data and forming a data frame, and wherein the means for writing the data to an optical disc comprises scrambling means for scrambling the formed data frame, error correction encoding means for encoding said data frame to form an ECC block, interleaving means for interleaving the data in the ECC block, encoding means for encoding the
10 interleaved data, and mastering means for representing the encoded data on an optical disc.

26. Apparatus for copying optical discs as claimed in Claim 25, wherein the data is read from the data frame without any additional codes, and the means
15 for writing the data to an optical disc comprises means for generating additional codes for the read data to form a data frame for input to said scrambling means.

27. Apparatus for copying optical discs as claimed in any of Claims 21 to 26, wherein said decoding and encoding means operate in accordance with EFM
20 Plus encoding, and wherein said mastering means comprises a laser cutter.

28. Software or firmware for use with an optical disc drive to enable the copying of optical discs, the software or firmware comprising instructions for
25 reading data from an optical disc at a selected level which differs from the user data level, and instructions to write the read data from the selected level to an optical disc to create a copy of the disc.

29. Software or firmware as claimed in Claim 28, wherein the data levels at
30 least comprise, from highest to lowest, the user data level, a data frame level, an error corrected level, and an encoded data level, and wherein the software or firmware further comprises instructions to read the data from the optical disc at the error corrected level.

30. Software or firmware as claimed in Claim 29, further comprising
35 instructions to read the data from the error corrected level without any error

correction codes, and to write the read data to an optical disc with the writing step involving generating error correction codes for the read data.

31. Software or firmware as claimed in Claim 29, further comprising
5 instructions to read the data from the error corrected level together with any error correction codes and to write the read data to an optical disc.

32. Software or firmware as claimed in Claim 30 or Claim 31, wherein the
10 instructions to write the read data to an optical disc comprise instructions to interleave the read data together with the error correction codes, to form the interleaved data into physical sectors, to encode the data in the physical sectors in accordance with EFM Plus encoding and to write the resultant bit stream to the optical disc.

15 33. Software or firmware as claimed in Claim 28, wherein the data levels at least comprise, from highest to lowest, the user data level, a data frame level, an error corrected level, and an encoded data level, and further comprising instructions to read the data from the optical disc at the data frame level.

20 34. Software or firmware as claimed in Claim 33, further comprising instructions to read the data from the data frame level without any additional codes, and to write the read data to an optical disc with the writing step involving generating additional codes for the read data.

25 35. Software or firmware as claimed in Claim 34, further comprising instructions to generate additional codes including sector numbers.

36. Software or firmware as claimed in Claim 33, further comprising
30 instructions to read the data from the data frame level together with any additional codes and to write the read data to an optical disc.

37. Software or firmware as claimed in any of Claims 34 to 36, wherein the
instructions to write the read data to an optical disc comprise instructions to
scramble and subsequently error correct the read data together with the
35 additional codes, to interleave the error corrected data, to form the interleaved data into physical sectors, to encode the data in the physical sectors in

accordance with EFM Plus encoding, and to write the resultant bit stream to the optical disc.

38. Software or firmware as claimed in Claim 28, wherein the data levels at least comprise, from highest to lowest, the user data level, a data frame level, an error corrected level, an interleaved level, and an encoded data level, and further comprising instructions to read the data from the optical disc at the interleaved level, and to write the read data to an optical disc.
39. Software or firmware as claimed in Claim 28, wherein the data levels at least comprise, from highest to lowest, the user data level, a data frame level, an error corrected level, and an encoded data level, and further comprising instructions to read the data from the disc at the encoded data level, and to write the read encoded data to an optical disc.
40. Software or firmware as claimed in any of Claims 28 to 39, further comprising instructions to create the Lead-In for the optical disc being written.
41. Software or firmware as claimed in Claim 40, further comprising instructions to specify in the created Lead-In the physical characteristics and/or manufacturing information for the optical disc being written.
42. Software or firmware as claimed in any of Claims 28 to 39, further comprising instructions to specify physical characteristics of the optical disc being written and to write the specified physical characteristics to the Lead-In on the optical disc.
43. Software or firmware as claimed in any of Claims 28 to 39, and Claim 42, further comprising instructions to specify manufacturing information for the optical disc being written and to write the specified manufacturing information to the Lead-In on the optical disc.
44. Software or firmware as claimed in any of Claims 28 to 39, further comprising instructions to enable reading and writing of discs using absolute sector addresses, and to use the absolute sector addresses to read the entire data in the Lead-In of a copy protected optical disc, and to write the data read

from the Lead-In to the Lead-In of the optical disc being written.

45. Software or firmware as claimed in any of Claims 28 to 39, further comprising instructions to enable reading and writing of discs using negative relative sector addresses, to use the negative relative sector addresses to read
5 the entire data in the Lead-In of a copy protected optical disc, and to write the data read from the Lead-In to the Lead-In of the optical disc being written.